

Hazwaste Source Reduction - Fact Sheet

Source reduction is any action which causes a net reduction in the generation of hazardous waste, and may also include any steps taken before a hazardous waste is generated to lessen the properties which cause the waste to be classified as hazardous.

Source reduction planning can be particularly beneficial for businesses evaluating source reduction for the first time. Often, simple and inexpensive source reduction measures can be identified that will reduce significant quantities of wastes. Due to the low cost of these measures, the economic benefits of implementing source reduction can be large.

Source Reduction Options

Evaluate and consider implementing the following source reduction opportunities at your facility.

Administrative steps: Good operating practices that apply to the human aspect of conducting daily operations at your facility, such as employee education, inventory control, materials storage and handling, spill & leak control, and business practices.

Production process changes: Process changes, changes in production methods or techniques, equipment modifications, changes in process operating conditions (temperature, pressure, etc.), automation, or the return of materials or their components for reuse within existing processes.

Input changes: Changes in raw materials or feedstocks to reduce, avoid, or eliminate the hazardous materials that enter the production process, thereby avoiding the generation of hazardous wastes within the production process.

Product reformulation: Changes in the design, composition, or specification of final or intermediate products.

Operational improvements: Activities such as loss prevention, waste segregation, production scheduling, maintenance operations, and overall site management.

Source Reduction Checklist

Since this checklist is intended to provide general source reduction guidance to various business sectors, some of the options listed may not be applicable. Use the following checklist to determine if your business is taking advantage of opportunities to reduce hazardous waste before it is generated. The preferred answers are in bold print, and helpful suggestions or benefits are in the right hand column.

Administrative Steps

Employee Education

- Do you offer employee training on how to avoid excessive waste generation through the proper handling and storage of materials?

- Do you publicize your source reduction achievements in the form of a newsletter or other publications to your employees and your community?
- Are job functions defined for each employee?
- Are periodic sessions held to keep employees up-to-date on source reduction measures in the use of hazardous materials?
- Are regular meetings held to keep personnel current on hazardous materials management policy and procedures?
- Are employees educated in source reduction techniques and encouraged to apply them?

Management should make a commitment to develop awareness of source reduction among employees, and offer education and training opportunities. You can reduce the amount of hazardous waste generated due to spills if you train your employees to properly handle and store hazardous materials.

Sharing source reduction successes encourages source reduction awareness among employees. Successful source reduction activities can help earn and retain customers and clients.

Identifying specific duties for personnel can help you prevent the mishandling of hazardous materials. Communicate to employees what their job entails, and make sure they understand what is expected of them. Make source reduction a part of everyone's job. Provide written guidance, such as a job manual. Encourage workers to offer source reduction suggestions.

Source reduction training is not a one time exercise. A full time, on-going commitment must be made by both the owners and operators of a business.

As new developments occur in hazardous materials management, employees should be kept informed in order to perform their duties more efficiently.

Introducing employees to source reduction concepts will allow them to develop innovative ideas that enable you to reduce disposal costs, minimize liability, and protect worker health and safety.

Inventory Control

- Are raw material containers inspected before being accepted?
- Are all raw materials tested or checked before being accepted from the suppliers?
- Are raw material containers dated as received?
- Do you use a "first-in, first-out" materials usage policy?
- Do you purchase only enough raw materials and perishable hazardous materials that will be

used before they become outdated?

- Are material balances performed for the critical processes at your site?
- Are material inventories computerized? Do you track the usage of raw materials?

Inspecting containers before accepting them can prevent the receipt of leaking or damaged containers which can lead to a hazardous spill and expensive clean-up and disposal costs.

Off-specification raw materials, if accepted, can become hazardous waste. In addition, the use of these materials may generate an off-specification product which may then require disposal as a hazardous waste. Some off-specification products can be reworked into usable products.

A received date is important for keeping track of the shelf life of a raw material and preventing materials from becoming obsolete and a hazardous waste. It also comes in handy when rotating stock.

Using materials in a “first-in, first-out” order can prevent stock from becoming obsolete and a hazardous waste. You can easily rotate and maintain your stock by labeling, dating, and inspecting new material containers as they are received. Then, use the earliest labeled stock.

Having a minimum supply of raw materials can prevent accumulation and eliminate large amounts of excess materials which may not be used at a later date. Also, overstocking of perishable materials can contribute to hazardous waste generation.

Performing a material balance for critical processes will allow you to ensure the efficiency of production, as well as optimize your source reduction efforts by knowing the raw materials entering and the products and wastes leaving your processes.

Computerizing your inventory will allow you to keep track of the materials used, and how much is remaining. This will allow you to keep the material levels at a point where you use up your materials in stock just as new materials are arriving.

Materials Storage and Handling

- Are hazardous materials stored in covered containers?
- Are storage areas for hazardous materials and flammable materials area covered?
- Are hazardous materials stored separately from non-hazardous materials?
- Are materials stored in reusable containers?
- Are raw materials stored in high traffic areas?

- If yes, can traffic through the storage area be reduced?
- Do you conduct practice drills for major spills?

Covering individual containers can prevent evaporation, contamination by foreign particles, and the frequency of spills.

Hazardous / flammable materials are best protected in covered areas. Uncovered storage areas allow rainwater to contaminate raw materials and can increase the volume of hazardous waste. Sunlight can degrade or change the character of raw materials. Absorbed heat can raise pressure inside containers, creating a potentially dangerous situation.

Hazardous materials should be stored separately from nonhazardous materials to prevent the creation of larger amounts of hazardous waste if a spill occurs.

Storing materials in reusable containers will allow you to return the empty container to the supplier and reduce the amount of waste generated. Check with your supplier to see if return options are available.

Heavy traffic may contaminate raw materials with dirt or dust, and may cause spilled materials to become dispersed throughout your site.

Periodic drills can improve the readiness and effectiveness of employees in dealing with emergency situations. You can reduce wastes generated from spills and their cleanup with a quick response to a spill.

Business Practices

- Do you have a formal policy or mission statement stating your commitment to source reduction?
- Do you offer an incentive program to employees to promote good housekeeping practices?
- Does your accounting procedure allocate the costs associated with the management of hazardous wastes to the process generating the hazardous wastes?

A formal statement supporting source reduction is an important part of encouraging employee source reduction awareness.

Incentive programs encourage employees to follow good housekeeping practices. Incentive programs do not have to be monetary programs, but can involve other incentives such as recognition or awards.

Separate accounting of hazardous waste management costs by process or production area can be a valuable tool to prioritize source reduction efforts by directing initial attention to the most costly wastes. Sometimes just by individualizing the cost of waste management, workers will find ways

to reduce waste generation.

Production Process Changes

- Do you use automated feeding systems to feed raw materials into your processes?
- If you are planning any future plant modernizations, can you consider replacing existing equipment with more efficient ones which generate less hazardous waste?
- Have you investigated the effect of reduced cleaning on product quality?

Automated feeding systems can help reduce spillage. Switching from numerous small containers to one larger container can help reduce cleaning waste. For large scale dedicated equipment, clean-in-place systems are effective in reducing cleaning waste.

More efficient equipment can reduce your total hazardous waste volumes while meeting or exceeding current production rates.

Unnecessary cleaning of equipment increases the amount of cleaning wastes generated. The feasibility of eliminating cleaning steps between subsequent production steps should be explored. Conduct a small scale experiment to determine the degree of contamination due to eliminating a cleaning step. If the product stays within quality control standards, then the cleaning step can be eliminated.

Input Changes

- Have you researched the use of non-hazardous or less hazardous material alternatives?
- Have you considered substituting aqueous cleaners for petroleum based or chlorinated solvents?
- If you are using caustic cleaners, have you tried alternative commercial cleaning solutions?
- Are biodegradable, film-free detergents a possible substitution for cleaning solvents?

Substitution of non-hazardous or less hazardous materials for hazardous materials reduces or eliminates a hazardous waste stream. (Alternatives should be fully investigated before making a final decision.)

Make sure the cleaning is really necessary. Some companies have found that they can completely eliminate some cleaning steps with no effect on product quality.

You may be able to replace caustic cleaning solutions with commercial alkaline cleaners. Check with vendors to see if effective alternatives are available.

Use of biodegradable cleaners could eliminate hazardous wastes such as solvent contaminated rags, waste cleaning solvent, and empty solvent containers. Biodegradable cleaners have two

significant environmental benefits over solvents: they don't contribute to photochemical smog as do volatile organic compounds (VOC's), and they do not present a respiratory health hazard to workers.

Using low VOC paints and coatings can reduce hazardous waste and air pollution, as well as significantly reduce the need for and the use of potentially hazardous materials, such as solvents derived from petroleum distillates. Exercise caution when selecting or using low VOC paints since they may still contain toxic metal pigments.

Product Reformulation

- Can you modify the specifications, design, or composition of your product so that less hazardous waste is generated?

If your product results in a hazardous waste at the end of its service life, it may be costly to manage as a hazardous waste, and may be a long term liability to you and your customers.

Operational Improvements

- Do you segregate your waste streams?
- Do you segregate all empty bags, packages, and containers that held hazardous materials from those that contained non-hazardous materials?
- Are your hazardous waste and non-hazardous waste containers properly labeled?
- Are liquid materials transferred using pumps and piping?
- Are the materials stored close to the process areas where they are used?
- Do you maintain and enforce a clear policy of using raw materials only for their intended uses?
- Do you plan your production schedule to reduce the generation of hazardous waste?
- Have you attempted to purchase pre-weighed materials in soluble bags?
- Do you plan your mixing operations so that you will only use the necessary raw materials?

Treatment and disposal of mixed wastes can be difficult and costly.

Segregating wastes will aid in recycling materials, and eliminate the mixing of non-hazardous wastes with hazardous wastes.

Properly labeled containers can decrease the likelihood of mixing incompatible wastes which may cause an explosion, or mixing hazardous wastes with non-hazardous wastes which could increase your volume of hazardous waste.

Transporting liquids using pumps and piping can help you reduce the amount of chemicals spilled during transfer.

Storing materials near the processing areas where they are used will reduce the distance you need to transport them, and thereby reduce the potential for spills during handling.

You may generate unnecessary hazardous waste if you use supplies for purposes other than their intended uses. For example, don't use equipment cleaning solvents to clean floors.

Plan your production schedule in a way that reduces the need for intermediate storage and excessive cleaning. For example when mixing paints, do you schedule the tint mixing from light to dark to avoid excessive cleaning, or mix only those paints having a common base at one time?

Additives may be available in pre-weighed soluble bags which do not require container disposal.

Planning is the key to efficiency. Plan your mixing so that you use only the necessary components. A properly sized container will also reduce waste.

- Do you test your products on a small scale before attempting full scale production?
- The solvent waste generated for disposal is:
 - drummed for disposal?
 - drummed for disposal after being reused _____ times.
 - drummed for use in a subsequent process?
 - sent to a holding tank?
- Is the piping to and from raw material or product tanks "pigged" before flushing?
- What is the cleaning method used for cleaning raw material and product storage tanks?
 - manually scraped?
 - washed with high pressure spray system using caustic, then solvent rinsed?
- Is there an established procedure for communication between cleaning and production crews?

Accurate small scale tests can eliminate the production of off-specification products, which can become hazardous wastes.

Maximize your benefits from the solvents you do use. Reusing solvents as much as is practicable can significantly reduce your total solvent waste generation. For example, can you reuse a solvent from a process cleaning operation as a product thinner or ingredient?

Use plastic or foam "pig" to clean pipes. the "pig" (slug) is forced through the pipe from the tank. The "pig" pushes ahead any product left clinging to the walls of the pipe. This increases yield and reduces the amount of pipe cleaning required.

The equipment (launcher and catcher) must be carefully designed so as to prevent spills, sprays, and potential injuries, and the piping runs are free of obstructions so that the “pig” does not become stuck or lost in the system.

To reduce the amount of product left clinging to the walls of a raw material or product storage tank, use rubber wipers to scrape the tank sides.

Mechanization or automation of this step should be considered to increase raw material yield and reduce the quantity of waste produced from tank cleaning.

Proper coordination between production and cleaning crews can prevent product drying in tanks and becoming waste.

- Have you established procedures for cleaning process equipment?
- Is the equipment cleaned immediately after processing is completed? Is there a scheduled maintenance and cleaning program?

Have you considered a high pressure spray system for cleaning parts and equipment?

- Do you capture unused raw material or product prior to cleaning process equipment?
- Do you follow the manufacturer’ s suggested methods for using and cleaning your process equipment?
- Can you install counter current rinsing processes?

Equipment should be cleaned immediately after processing in order to reduce the amount of solvent that will be necessary to clean it.

In some instances, having a scheduled maintenance and cleaning program for process equipment and parts can have a profound impact on reducing hazardous waste.

High pressure spray systems can be used to clean equipment and tanks, and to reduce water use by 80% to 90%. In addition, high pressure sprays can remove partially dried product so that the need for caustic cleaners is reduced.

The method for saving unused raw material or product will be process specific. In general, capturing as much material as possible before cleaning is important because it saves on the use of cleaning solvent.

It is important to follow the manufacturer’ s suggested procedures. These are intended to maximize efficiency and minimize waste.

Counter current rinsing can reduce waste generation, especially if the most concentrated bath

becomes makeup for the process solution.